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Fertilizer Recommendations

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Fertilizer recommendations are interpreted from a soil test value. The interpretations are based on field research that compares crop yield to soil test levels and the amount of fertilizer applied. These field studies provide data to compare relative yield of a crop for a measured soil test value and fertilizer recommendations are then calibrated to these soil test values.

For these reasons, soil samples submitted for analysis must accurately represent the field or area from which they were taken. In making fertilizer recommendations, we assume that soil samples were properly taken and handled.

Soil test values reported from a laboratory are determined using a specific set of analytical methods. In Kentucky, the Division of Regulatory Services in the College of Agriculture uses Bray's P-1 for phosphorus, and neutral, normal ammonium acetate for potassium, calcium, and magnesium. Zinc is extracted with 0.1 normal hydrochloric acid. No test for nitrogen is made as the concentration of plant available nitrogen varies greatly under Kentucky conditions. With the high degree of variation, it is difficult to correlate measured values to predicted yield response for nitrogen. The lime and fertilizer recommendations published by U. K. each year in AGR-1 are specifically interpreted for use of these analytical procedures and should not be used for soil test values obtained by any other testing methods.

Not all universities agree on the philosophy for interpreting soil tests. One method used is the deficiency correction plus starter approach. This involves use of a row-applied starter fertilizer at planting to overcome adverse early season growing conditions. Additional amounts of fertilizer may be recommended for broadcast application to correct any deficiencies. Another approach is maintenance plus buildup. In this case an amount of nutrients equal to that removed from the field is applied along with an additional amount for soil test buildup.

The U. K. lime and fertilizer recommendations include some of both philosophies mentioned above. Fertilizer rates recommended at all soil test values below a high level are for the profitable production of the crop to be grown each year plus an additional amount that will slowly build up soil test levels of phosphorus and potassium. With these fertilizer rates it will likely take 4 or more years of annual application for an appreciable soil test increase. The deficiency correction approach is the most profitable annual use of fertilizer dollars. When some increase in soil test values is needed, particularly at low soil test levels, there is need to increase values to a higher level in order to reduce future annual fertilizer costs. This

would require buildup additons.

The probabilities of yield increases with a phosphorus test for corn and soybeans in Kentucky are:

Soil Test P	Level	Corn Response	Soybean Response
0-10	Very low	Highly probable	Highly probable
10-30	Low	Probable	Possible
30-60	Medium	Possible	Maybe
60+	High	Not likely	Not likely

Fertilizer recommendations are based on the probability of profitable yield increases for farmers. Yield increases with phosphorus will occur in the medium range more often with corn than with soybeans. This increased probability is related to more frequent yield increases with corn in cool wet periods during early plant growth.

Economic considerations are important to determine the upper level of fertilization. Values of the expected crop increase relative to fertilizer cost is especially important. It is necessary to estimate the yield of a particular crop and its probable value in absolute terms. The most profitable amount of fertilizer will be the amount applied at the point where a dollar is returned for each dollar spent on fertilizer. Making such a computation depends on having an accurate soil test value and an interpretation of the soil test results from sound research.

Research results are needed to calibrate a soil test in the area where it is to be used. A program to expand collection of this kind of data was extended in 1980 to several on-farm locations in Kentucky. Anticipated long-term continuation of these studies will enable us to increase the accuracy of fertilizer recommendations on several important soils in Kentucky.